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(54) Disc brake calipers

(57) A cast aluminium disc brake caliper body (11) having two limbs (12) and (13) interconnected by a bridge (14) has one limb (13) fixed to a reaction member (eg. a stub axle) and the braking loads on the other limb (12) are transmitted back to the

reaction member via the bridge (14), the bridge (14) being reinforced by embedded plate (21) interconnecting the two limbs.

As shown, the limb (13) has two side-by-side through-bore hydraulic cylinders (16) cast therein while limb (12) has two opposed side-by-side single-ended cylinders (17) cast therein.

Plate (21) is shown with two identical end portions (24, 25) having three fork arms (27), which may pass beneath the adjacent cylinders. Limb (12) may have additional or alternative reinforcement (28). Plate (21) may be cast iron, steel sheet or titanium.

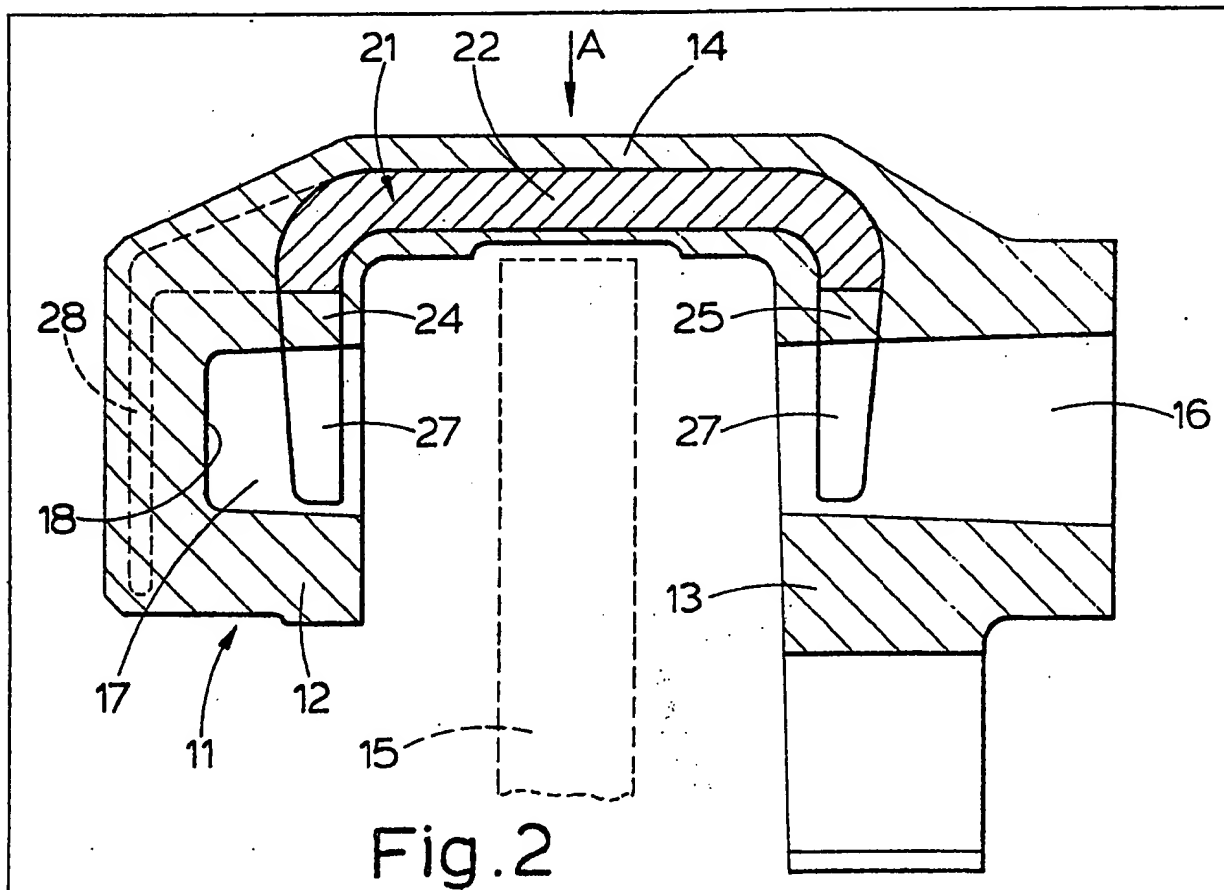
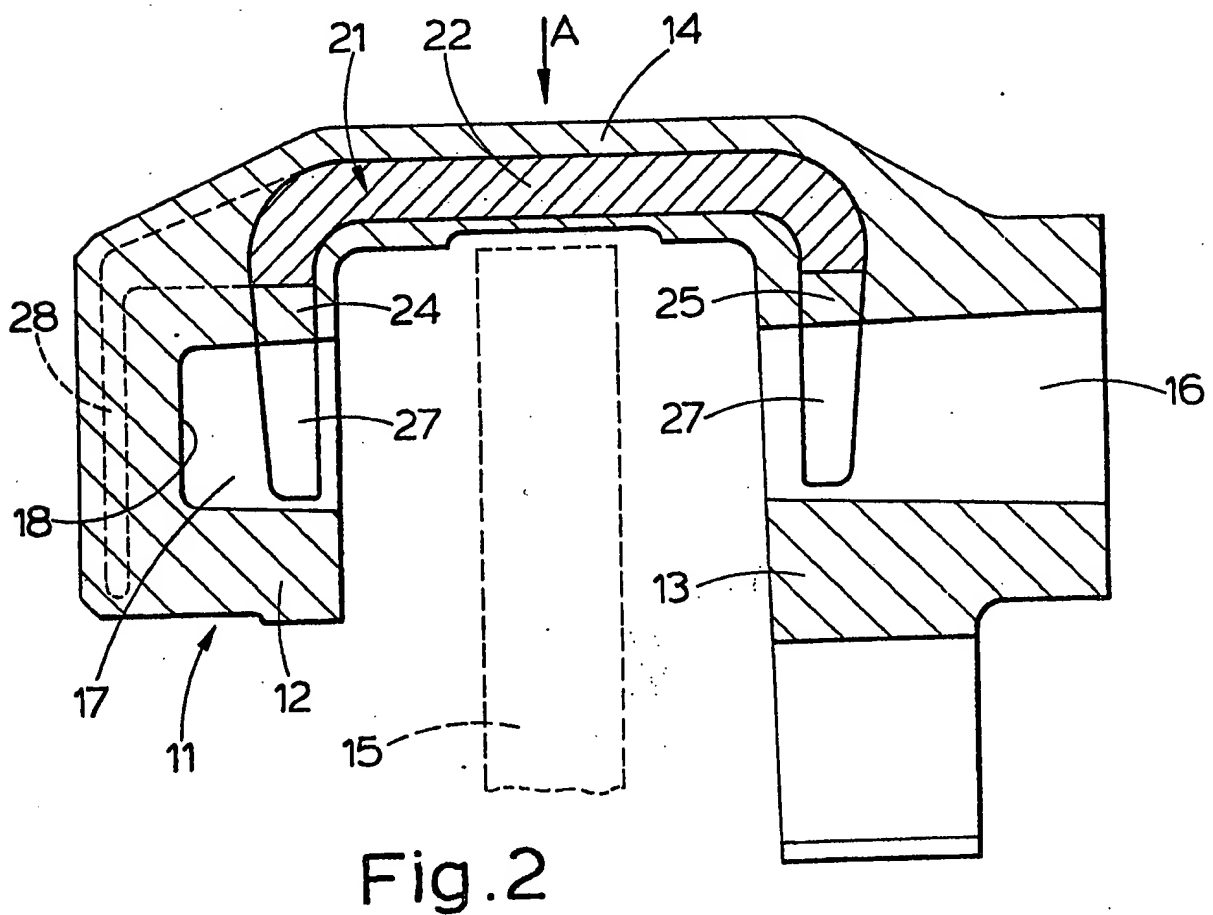
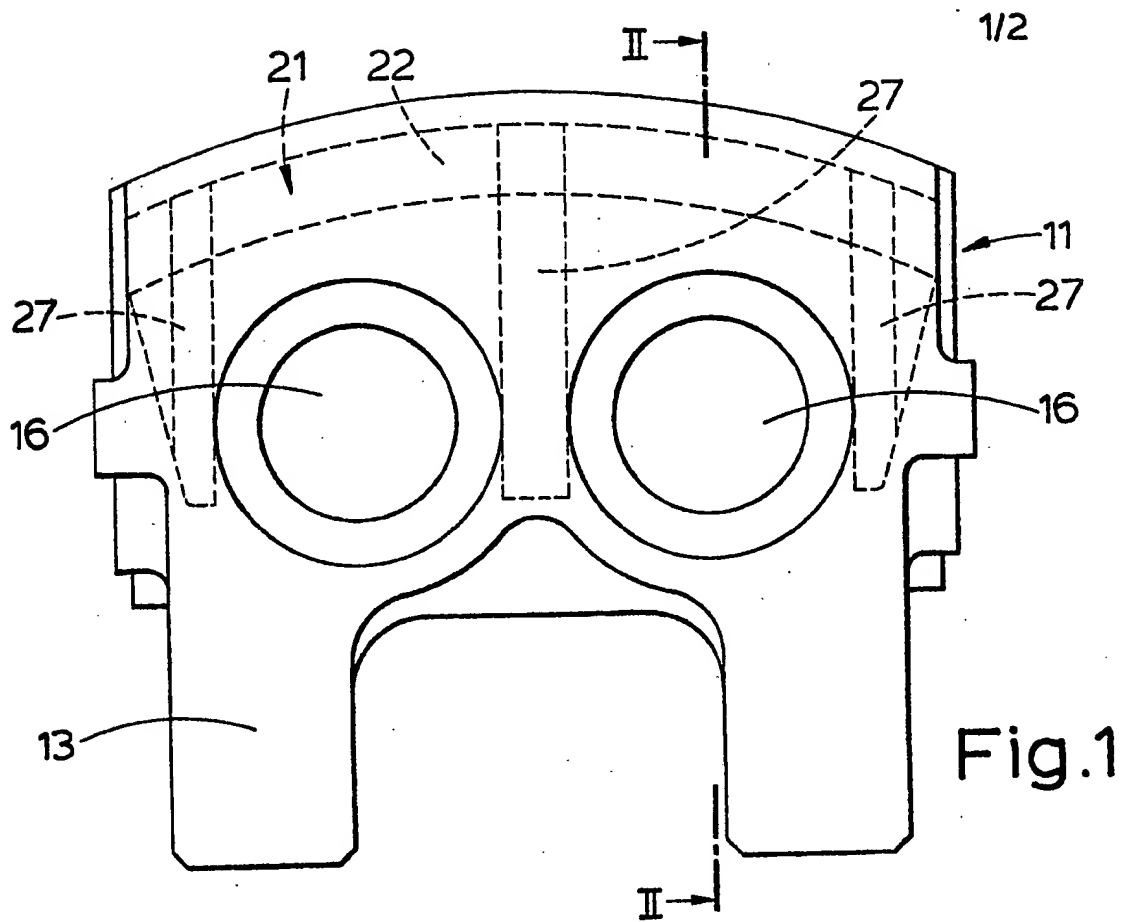


Fig. 2



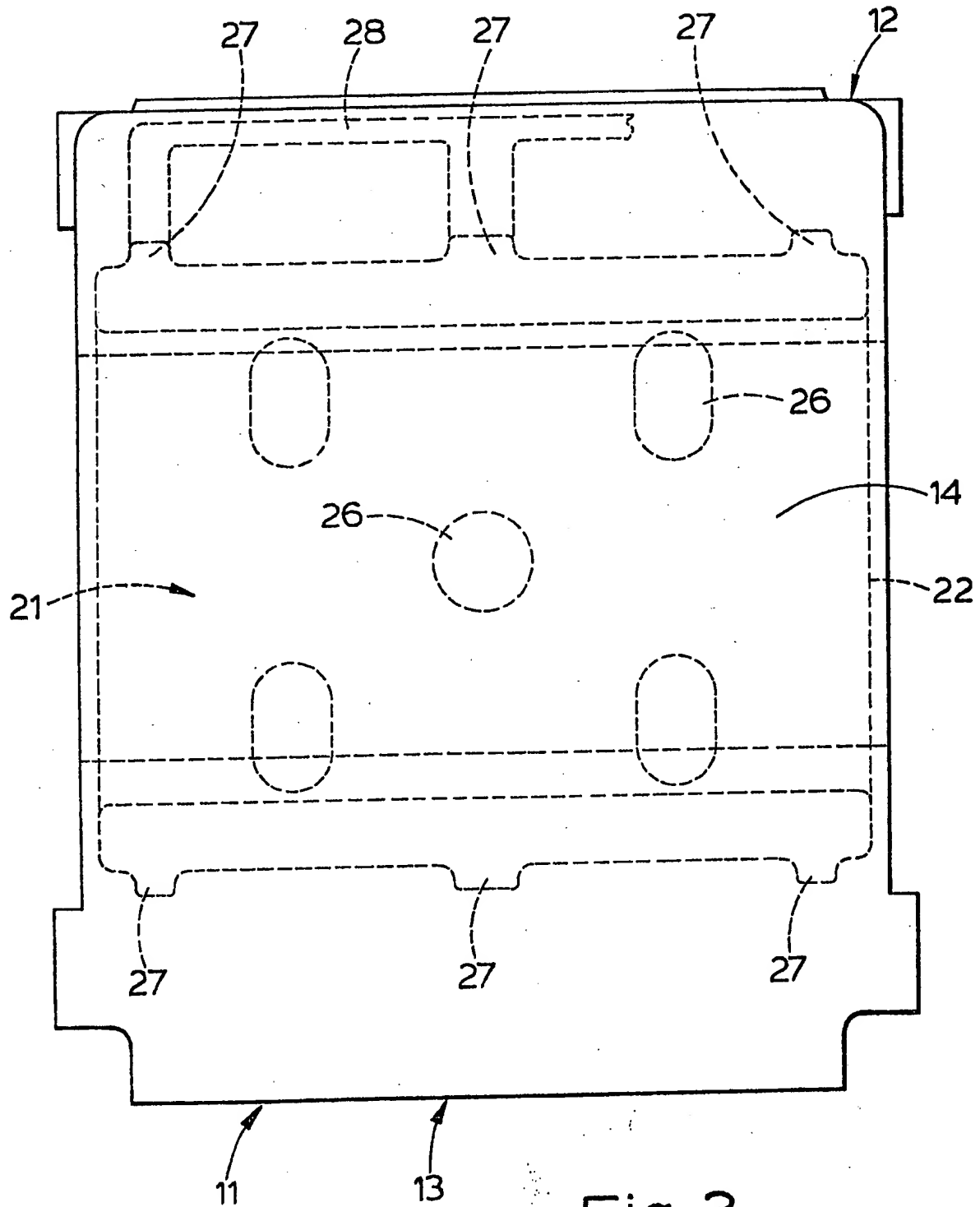


Fig. 3

SPECIFICATION

Disc brake calipers

This invention relates to disc brake caliper bodies of the kind having two limbs straddling the outer periphery of a brake disc, one limb having a hydraulic cylinder therein and being connectable to a reaction member on one hand and being connected on the other hand to the other limb, by a bridge extending across the outer periphery and through which braking loads are transmitted from the other limb to the reaction member.

Such a caliper body will hereinafter be called, a caliper body of the kind referred.

A problem associated with disc brakes is that in order to maximise the braking effect it is desirable for the brake disc to have as large a diameter as is practical. Since wheels are nominally of a standard size, particularly in a narrow field of applications such as racing cars, and the caliper bridges the outer periphery of the disc, then the size of the disc utilised with the standard wheel can be determined by the thickness of the caliper (i.e. radial thickness with respect to the disc) at the point where it bridges the disc. Therefore, to maximise the diameter of the disc the caliper bridge must be as thin as possible.

However, since the bridge also transmits the braking and clamping load from the other limb to the reaction member it must have sufficient strength not to distort. Therefore, for the transmission of these loads it may be desirable to have a thick bridge particularly if the caliper is formed from a light material such as aluminium. Since the use of aluminium on racing cars is desirable in order to cut down the weight of the vehicle it can be seen that the two factors of maximum brake disc size, and desired bridge strength tend to work against each other in determining a desired thickness of bridge.

It is the object of the present invention to provide an aluminium caliper body having a bridge of a minimal thickness but with the desired strength.

Accordingly there is provided a caliper body of the kind referred, being of cast aluminium and characterised in that the bridge contains a re-inforcing piece embedded within the aluminium bridge and interconnecting the two limbs.

Preferably the re-inforcing piece is a high strength cast iron plate and each end of the plate extends into a respective limb.

The invention will be described by way of example and with reference to the accompanying drawings in which:—

Fig. 1 is an elevation of a caliper body according to this invention;

Fig. 2 is a section on the line II—II of Fig. 1 but showing the re-inforcing plate in full and also showing the dotted outline of a brake disc when fitted; and

Fig. 3 is a view of the caliper body in the direction of arrow A in Fig. 2.

With reference to Figs. 1 to 3 a motor vehicle disc brake caliper body 11 is formed as an

aluminium die casting and comprises two limbs 12 and 13 interconnected by a bridge 14. In use the caliper body 11 straddles a brake disc 15 with a limb located on each side of the disc and one limb 13 is connectable to a torque reaction member e.g. a stub axle to which the braking loads are transmitted.

The limb 13 connectable to the reaction member has a pair of side-by-side hydraulic cylinders 16 cast therein and the other limb 12 likewise has a pair of opposed side-by-side cylinders 17 cast therein. For ease of casting the cylinders 16 are cast as through bores, and the cylinders 17 are formed as single-ended cylinders having the closed ends 18 formed in the casting.

In use, the hydraulic cylinder 16 and 17 both thrust friction pads (not shown) against the opposed surfaces of the disc 15, and the torque load from the limb 12 is transmitted via the bridge 14 and limb 13 to the reaction member. Thus the bridge 14 must be sufficiently strong to prevent the limbs 12 and 13 from spreading when the hydraulic loads are applied to the friction pads, and must also be capable of holding the outer limb 12 (outer with respect to the reaction member) against the friction drag when the pad is applied to the disc.

In order to strengthen the bridge 14 a re-inforcing plate 21 of spheroidal graphite cast iron is embedded in the caliper body 11 during the casting of the body. The re-inforcing plate 21 comprises a substantially flat middle portion 22 embedded in the bridge 14 flanked by two down turned end portions 24 and 25 that extend one into each limb 12 and 13 respectively. The middle portion 22 has apertures 26 therein to key the plate 21 into the cast body 11, and the two end portions 24 and 25 are identical to each other so that the plate 21 is symmetrical and can be placed into the cast body either way round.

Each of the end portions 24 and 25 is forked and has three fork arms 27 that pass one between and one each side of the pair of hydraulic cylinders 16 and 17 in the respective limb 13 or 12.

The limb 12 having the single-ended hydraulic cylinders 17 therein may also include an additional or alternative re-inforcement 28 that supports the closed end of the cylinders 17.

In addition the fork arms 27 could be extended to pass underneath the adjacent cylinder and join the adjacent arm.

Other possible materials for the re-inforcing plate are formed pressed steel sheet, or in specialist applications such as racing cars, titanium.

120 CLAIMS

1. A cast aluminium disc brake caliper body having two limbs for straddling the outer periphery of a brake disc, one limb having a hydraulic cylinder therein and being connectable to a reaction member on one hand and being connected on the other hand to the other limb by a bridge extending across said outer periphery and through which braking loads are transmitted from

the other limb to the reaction member, wherein said bridge contains a re-inforcing piece embedded within the aluminium bridge and interconnecting the two limbs.

5 2. A caliper body as claimed in Claim 1, wherein the piece has end portions that each extend into a respective limb.

3. A caliper body as claimed in Claim 2, wherein the respective end portion of the re-
10 inforcing piece embedded in the limb connected to the reaction member via the bridge supports the closed end of a single ended hydraulic cylinder therein.

4. A caliper body as claimed in Claim 2 or
15 Claim 3, wherein the respective end of the re-inforcing piece embedded in the limb connectable to the reaction member is forked, the arms of the fork passing one either side of the hydraulic cylinder.

20 5. A caliper body as claimed in any one of Claims 2 to 4, wherein said other limb also has a hydraulic cylinder therein, and the ends of the re-inforcing piece are substantially identical so that each end can be located in either limb.

25 6. A caliper body as claimed in Claim 5, when dependent upon Claim 4, wherein each limb has two hydraulic cylinders therein and each respective end of the re-inforcing piece has three arms.

30 7. A caliper body as claimed in any preceding claim, wherein the re-inforcing piece is a plate member.

8. A caliper body as claimed in any preceding claim, wherein the re-inforcing plate member is a
35 cast iron insert.

9. A cast aluminium disc brake caliper body substantially as described herein and as illustrated in the accompanying drawings.